CLAIMS

1. A method of forming a switchable circuit device, comprising

forming a mass over a substrate;

while the mass is over the substrate, forming pores within the mass to convert the mass to a porous matrix;

providing an active molecular switchable memory material within the pores of the porous matrix; and

forming an electrical connection to the porous matrix having the switchable memory material therein.

2. The method of claim 1 wherein the active molecular switchable memory material substantially completely fills the pores of the porous matrix in a finished construction.

3. The method of claim 1 wherein the active molecular switchable memory material only partially fills the pores of the porous matrix in a finished construction.

4. The method of claim 1 wherein the active molecular switchable memory material comprises two stable states which can be interchanged with one another through reduction and oxidation.

5. The method of claim 1 further comprising utilizing the active molecular switchable memory material under conditions in which only two stable states of the material are interchanged with one another.

6. The method of claim 5 wherein the two stable states are interchanged with one another through oxidation and reduction.

7. The method of claim 1 wherein the substrate is a semiconductor substrate.

8. The method of claim 1 wherein the mass comprises silicon.

9. The method of claim 1 wherein the mass consists essentially of silicon.

10. The method of claim 1 wherein the mass consists of silicon having one or more dopant materials dispersed therein.

11. The method of claim 1 wherein the active molecular switchable memory material comprises a redox-active catenane.

12. The method of claim 1 wherein the active molecular switchable memory material comprises a redox-active rotaxane.

13. The method of claim 1 wherein the active molecular switchable memory material comprises a redox-active pseudorotaxane.

14. A method of forming a switchable circuit device, comprising

providing a semiconductive material substrate;

forming at least one n-type doped region within the substrate and beneath an uppermost surface of the substrate;

forming at least one porous matrix over the at least one n-type doped region;

providing an active molecular switchable memory material within the pores of the at least one porous matrix; and

forming a conductive line over and in electrical contact with the at least one porous matrix having the switchable memory material therein.

15. The method of claim 14 wherein the at least one porous matrix is in physical contact with the at least one n-type doped region.

16. The method of claim 14 wherein the semiconductive material of the substrate comprises monocrystalline silicon.

17. The method of claim 14 wherein the active molecular switchable memory material comprises a redox-active catenane.

18. The method of claim 14 wherein the active molecular switchable memory material comprises a redox-active rotaxane.

19. The method of claim 14 wherein the active molecular switchable memory material comprises a redox-active pseudorotaxane.

20. The method of claim 14 wherein the forming the at least one porous matrix comprises:

implanting a p-type dopant into the substrate to form at least one p-type doped region over the at least one n-type doped region; and

converting the at least one p-type doped region into the at least one porous matrix.

21. The method of claim 20 wherein the at least one p-type doped region has a lateral periphery which extends laterally outward beyond a lateral periphery of the at least one n-type doped region.

22. A method of forming a switchable circuit device, comprising

forming a mass over a substrate;

while the mass is over the substrate, forming pores within the mass to convert the mass to a porous matrix;

providing a mixture of active molecular switchable memory material within a liquid carrier;

providing the mixture within the pores of the porous matrix material;

volatilizing the carrier from within the pores to leave the active molecular switchable memory material remaining within the pores;

providing an active molecular switchable memory material within the pores of the porous matrix; and

forming an electrical connection to the porous matrix having the switchable memory material therein.

23. The method of claim 22 wherein the active molecular switchable memory material substantially completely fills the pores of the porous matrix in a finished construction.

24. The method of claim 22 wherein the active molecular switchable memory material only partially fills the pores of the porous matrix in a finished construction.

25. The method of claim 22 wherein the providing the mixture within the pores of the porous matrix material comprises dipping the porous matrix material into the mixture.

26. A method of forming a switchable circuit device, comprising:

providing a semiconductor substrate;

forming a first conductive wiring layer supported by the substrate;

forming porous silicon over the conductive wiring layer;

providing an active molecular switchable memory material within pores of the porous silicon; and

forming a second conductive wiring layer over the porous silicon and over the active molecular switchable memory material within the pores of the porous silicon.

27. The method of claim 26 wherein the substrate comprises monocrystalline silicon, and wherein the first conductive wiring layer comprises an n-type doped region extending within the monocrystalline silicon of the substrate.

28. The method of claim 26 further comprising:

forming an electrically insulative layer over the semiconductor substrate;

forming trenches within the electrically insulative layer; and

forming the first conductive wiring layer within the trenches.

29. The method of claim 28 wherein the first conductive wiring layer comprises conductively doped silicon.

30. The method of claim 28 wherein the first conductive wiring layer comprises silicon conductively doped with n-type dopant.

31. The method of claim 28 wherein the first conductive wiring layer only partially fills the trenches, and wherein the porous silicon is formed within the partially filled trenches.

32. The method of claim 26 wherein the active molecular switchable memory material comprises a redox-active catenane.

33. The method of claim 26 wherein the active molecular switchable memory material comprises a redox-active rotaxane.

34. The method of claim 26 wherein the active molecular switchable memory material comprises a redox-active pseudorotaxane.

35. The method of claim 26 wherein the providing the active molecular switchable memory material within the pores of the porous silicon comprises:

forming a mixture of the active molecular switchable memory material within a liquid carrier;

providing the mixture within the pores of the porous silicon; and

volatilizing at least some of the carrier from within the pores to leave the active molecular switchable memory material remaining within the pores.

36. The method of claim 35 wherein the providing the mixture within the pores of the porous silicon comprises dipping the porous silicon into the mixture.

37. A method of forming a semiconductor construction, comprising:

providing a semiconductor substrate;

forming an electrically insulative material over the semiconductor substrate;

forming trenches extending into the electrically insulative material;

forming a first conductive wiring layer within the trenches to partially fill the trenches;

forming porous silicon over the first conductive wiring layer within the trenches;

providing an active molecular switchable memory material within pores of the porous silicon;

forming a planarized upper surface extending across an uppermost portion of the porous silicon and across an uppermost portion of the insulative material; and

forming a second conductive wiring layer over the planarized upper surface.

38. The method of claim 37 wherein the forming the planarized upper surface occurs after providing the active molecular switchable memory material within pores of the porous silicon.

39. The method of claim 37 wherein the forming the planarized upper surface occurs before providing the active molecular switchable memory material within pores of the porous silicon.

40. The method of claim 37 wherein the forming the planarized upper surface comprises chemical-mechanical polishing.

41. The method of claim 37 wherein the first conductive wiring layer defines lines extending primarily along a first direction within the trenches; and wherein the second conductive wiring layer is formed in a shape of a line extending primarily along a second direction substantially perpendicular to the first direction.

42. The method of claim 37 wherein the active molecular switchable memory material comprises a redox-active catenane.

43. The method of claim 37 wherein the active molecular switchable memory material comprises a redox-active rotaxane.

44. The method of claim 37 wherein the active molecular switchable memory material comprises a redox-active pseudorotaxane.

45. The method of claim 37 wherein the first conductive wiring layer comprises conductively doped silicon.

46. The method of claim 37 wherein the first conductive wiring layer comprises silicon conductively doped with n-type dopant.

47. A switchable circuit device, comprising:

a porous silicon matrix; and

active molecular switchable memory material within the porous silicon matrix.

48. The switchable circuit device of claim 47 wherein the active molecular switchable memory material substantially completely fills the porous matrix.

49. The switchable circuit device of claim 47 wherein the active molecular switchable memory material only partially fills the porous matrix.

50. The switchable circuit device of claim 47 wherein:

the active molecular switchable memory material has two stable states;

the porous silicon is supported by a semiconductor substrate;

the porous silicon has a first side and a second side in opposing relation to the first side;

a first conductive line is on the first side of the porous silicon;

a second line is on the second side of the porous silicon; and

a current flow from the first conductive line to the second conductive line depends on which of the stable states that the active molecular switchable memory material is in.

51. The switchable circuit device of claim 47 wherein the active molecular switchable memory material comprises a redox-active catenane.

52. The switchable circuit device of claim 47 wherein the active molecular switchable memory material comprises a redox-active rotaxane.

53. The switchable circuit device of claim 47 wherein the active molecular switchable memory material comprises a redox-active pseudorotaxane.

54. A switchable circuit device, comprising:

a first conductive layer;

a porous silicon matrix over the first conductive layer; the porous silicon matrix comprising pores;

a material dispersed within the pores of the porous silicon matrix, the material having two stable states accessible during operation of the device;

a second conductive layer over the porous silicon matrix and material; and

wherein a current flow between the first and second conductive layers is influenced by which of the stable states the material is in.

55. The switchable circuit device of claim 54 wherein the material has only two stable states accessible during operation of the device.

56. The switchable circuit device of claim 54 wherein the two stable states of the material are interchanged by oxidation and reduction of the material.

57. The switchable circuit device of claim 54 wherein the two stable states of the material are interchanged by changing a voltage that the material is exposed to.

58. The switchable circuit device of claim 54 wherein the material comprises a redox-active catenane.

59. The switchable circuit device of claim 54 wherein the material comprises a redox-active rotaxane.

60. The switchable circuit device of claim 54 wherein the material comprises a redox-active pseudorotaxane.

61. A semiconductor construction, comprising:

a semiconductor substrate;

an insulative material over the semiconductor substrate;

trenches extending within the insulative material;

a first conductive wiring layer within the trenches and partially filling the trenches;

porous silicon over the first conductive wiring layer within the trenches;

an active molecular switchable memory material within pores of the porous silicon; and

a second conductive wiring layer over the porous silicon and active molecular switchable memory material therein.

62. The switchable circuit device of claim 61 wherein the active molecular switchable memory material comprises two stable states which are interchanged by oxidation and reduction of the material.

63. The semiconductor construction of claim 61 wherein the active molecular switchable memory material comprises a redox-active catenane.

64. The semiconductor construction of claim 61 wherein the active molecular switchable memory material comprises a redox-active rotaxane.

65. The semiconductor construction of claim 61 wherein the active molecular switchable memory material comprises a redox-active pseudorotaxane.

66. The semiconductor construction of claim 61 wherein the first conductive wiring layer comprises conductively doped silicon.

67. The semiconductor construction of claim 61 wherein the first conductive wiring layer comprises silicon conductively doped with n-type dopant.

68. The semiconductor construction of claim 61 wherein the first and second conductive wiring layers comprise conductively doped silicon.

69. The semiconductor construction of claim 61 wherein the first conductive wiring layer defines lines extending primarily along a first direction; and wherein the second conductive wiring layer is formed in a shape of a line extending primarily along a second direction substantially perpendicular to the first direction.